

REMARKS

Summary of the Office Action¹

Claims 1-87 have been canceled. Claims 89-94, 96-105, and 115 have been withdrawn. Claims 88, 116, and 118 have been amended. Claims 95, 106-114, 117, and 119-128 are also currently pending. No new matter has been added by any of the amendments to the claims.

The information disclosure statement filed on April 27, 2007 has been objected to for failing to comply with 37 C.F.R. §1.98(a)(2).

Claims 88, 95, and 116-119 were rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by, or in the alternative rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Hubner U.S. Patent No. 5,902,118 (hereinafter "Hubner").

Claims 106-108, 111-114, 120-122, and 125-128 have been rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Hubner in view of Faris U.S. Patent No. 5,786,629 (hereinafter "Faris") and Sakui et al. U.S. Patent No. 5,615,163 (hereinafter "Sakui").

Claims 109 and 123 have been rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Hubner in view of Faris and Sakui and Daberko U.S. Patent No. 5,787,445 (hereinafter "Daberko").

¹ The Office Action Summary states that the drawings filed on September 26, 2003 are objected to by the Examiner. However, there is no mention of this objection in the body of the Office Action. Applicant respectfully submits that this objection was obviated in the remarks of the April 27, 2007 reply, and requests that the Examiner particularly point out how the drawings are objected to so that applicant may file any necessary statements or corrections with the next communication.

Claims 110 and 124 have been objected to for being dependent upon a rejected base claim, but have been said to be allowable if rewritten in independent form. Applicant notes with appreciation the indication of allowable subject matter in claims 110 and 124. Applicant reserves the right to re-write claims 110 and 124 in independent form.²

The Examiner's objections and rejections are respectfully traversed.

The Objection to the Information Disclosure Statement

The Examiner objected to the Information Disclosure Statement ("IDS") filed April 27, 2007 for failing to comply with 37 C.F.R. § 1.98(a)(2).

In the April 27, 2007 IDS, applicant re-cited and enclosed copies of the five (5) foreign patent documents and the eight (8) non-patent literature publications that were not initialed by the Examiner on the copy of the September 26, 2006 Form PTO/SB/08 returned with the previous communication. Applicant respectfully submits that this IDS complied with 37 C.F.R. §1.98(a)(2), and requests that the Examiner particularly point out how the IDS did not comply with 37 C.F.R. § 1.98(a)(2) so that applicant may file any necessary IDS with the next communication.

² On page 14 of the Office Action, the Examiner states that claims 110 and 124 would be allowable "if rewritten to overcome the rejection(s) under 35 U.S.C. § 112, 1st paragraph, set forth in this Office Action." However, there is no rejection under 35 U.S.C. § 112 mentioned in the Office Action. Thus, applicant believes this statement is in error and is treating claims 110 and 124 as if they were not rejected under 35 U.S.C. § 112.

The Rejections Under 35 U.S.C. § 102/§ 103

Claims 88, 95, and 116-119 were rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by, or in the alternative rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Hubner. Claims 95, 106-114, and 119-128 were rejected under various combinations of one or more of Hubner, Faris, Sakui, and Daberko. These rejections are respectfully traversed.

Claims 88 and 116

Each one of amended independent claims 88 and 116 is directed towards an integrated circuit structure including first and second substrates. Each integrated circuit also includes, *inter alia*, a thermal diffusion bond between a first surface of a first substrate and a first surface of a second substrate.

As an initial matter, nowhere does Hubner show or suggest thermal diffusion bonds between two substrates. Instead, Hubner describes a method for producing a three-dimensional circuit arrangement using only two types of bonds: a solder bond using soldering metal (col. 5, lns. 44-54), and an adhesive bond described as being composed of polyimide (col. 3, ln. 18 and col. 6, lns. 22 and 60-63). Accordingly, any circuit arrangement formed by Hubner will have a combination of solder bonds between metal surfaces formed on substrate surfaces, and adhesive layer bonds composed of polyimide. Applicant respectfully submits that none of these bonds are thermal diffusion bonds.

The Examiner contends that Hubner's solder bonds are thermal diffusion bonds because they are "heated and when metals heat (i.e. thermal) they diffuse, hence thermal diffusion bonding" (See Office Action, page 2). Applicant respectfully submits that the Examiner's assertion is in error. One skilled in the art would

know that thermal diffusion bonds can only be created between two nominally flat surfaces under special conditions, namely:

(1) applied pressure (typically a vacuum); and (2) a temperature below the melting point of the parent materials. Thermal diffusion bonds also have inherent properties that provide an advantage over solder bonds, such as enhanced strength, ductility, and precision. Following the Examiner's flawed logic, one could achieve a thermal diffusion bond between a cell phone and a car roof by leaving the cell phone on top of the car roof on a hot summer day. There is no physical principle known to the applicant that could support such an assertion. Thus, Hubner's heated solder bonds are not thermal diffusion bonds. To support this argument, applicant is submitting two (2) articles that describe thermal diffusion bonds and how they are different from other types of bonds (see Exhibit A and Exhibit B attached at the end of this Reply). Accordingly, Hubner does not show or suggest a "thermal diffusion bond" as required by each of applicant's amended independent claims 88 and 116. For at least this reason, applicant respectfully submits that each of independent claims 88 and 116 is patentable over Hubner.

Applicant's amendments to each of claims 88 and 116 obviate the Examiner's assertion that the element "by thermal diffusion" of applicant's claims 88 and 116 makes claims 88 and 116 product-by-process claims. Even if applicant's claims 88 and 116 were product-by-process claims, which they are not, M.P.E.P. § 2113 states, "the structure implied by the process step should be considered when assessing the patentability of product-by-process claims over the prior art, especially where the product can only be defined by the process steps by which the process is made, or where the manufacturing steps would be expected to impart distinctive structural characteristics to the final product. See, e.g., *In re*

Garnero, 412 F.2d 276, 279, 162 USPQ 221, 223 (CCPA 1979)."

Applicant's claimed "thermal diffusion bond" imparts distinctive structural characteristics to applicant's claimed circuitry, and thus should be considered material to each of applicant's claims 88 and 116, and all claims dependent therefrom.

Claim 118

Amended independent claim 118 is directed toward an integrated circuit structure including first and second substrates that have first and second surfaces. The integrated circuit also includes, *inter alia*, a thermal compression bond between the first surface of the first substrate and the first surface of the second substrate.

Nowhere does Hubner show or suggest thermal compression bonds between two substrates. As explained above, Hubner only shows solder bonds and adhesive bonds made of polyimide, and none of these bonds are thermal diffusion bonds. Thermal compression bonds are substantially similar to thermal diffusion bonds, except that they generally require less heat and more pressure. Accordingly, Hubner does not show or suggest a "thermal compression bond," as required by applicant's amended independent claim 118. For at least this reason, applicant respectfully submits that independent claim 118 is patentable over Hubner.

Applicant's amendments to claim 118 obviates the Examiner's assertion that the element "by thermal compression" of applicant's claim 118 makes claim 118 a product-by-process claim. Even if applicant's claim 118 was a product-by-process claim, which it is not, M.P.E.P. § 2113 states, "the structure implied by the process step should be considered when assessing the patentability of product-by-process claims over the prior art, especially where

the product can only be defined by the process steps by which the process is made, or where the manufacturing steps would be expected to impart distinctive structural characteristics to the final product. See, e.g., *In re Garnero*, 412 F.2d 276, 279, 162 USPQ 221, 223 (CCPA 1979)." Applicant's claimed thermal compression bond imparts distinctive structural characteristics to applicant's claimed circuitry, and thus should be considered material to applicant's claim 118 and all claims dependent therefrom.

Claims 95, 106-114, 117, and 119-128

Applicant has shown that each of amended independent claims 88, 116, and 118 is allowable. Claims 95, 106-114, 117, and 119-128, each of which depend from one of claims 88, 116, and 118, are allowable at least because they depend from an allowable claim. Applicant respectfully requests that the rejection of these claims be withdrawn.

Withdrawn Claims

Applicant would like to point out that claims 89-94, 96-105, and 115, each of which depend from claim 88, are withdrawn. Once claim 88 is allowed, withdrawn dependent claims 89-94, 96-105, and 115 should be reinstated and allowed.

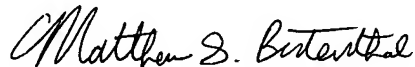
Conclusion

The foregoing demonstrates that claims 88, 95, 106-114, and 116-128 are allowable. This application is therefore in

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condition for allowance. Reconsideration and allowance are accordingly respectfully requested.

Respectfully submitted,



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